

Application of WINEGARDEN, et al.
Serial No.: 09/723,400
Amendment dated June 16, 2004

In the Claims:

Amendments to the Claims

Claims 1-17 (Cancelled).

Claims 18-43 (Withdrawn).

44. (Currently amended) A manifold assembly for removing liquid from a plurality of microarray spotting members, the spotting members each having a spotting member body and a first open end portion for printing a spot on a microarray slide, comprising:
a plate, the plate defining a plurality of fluid flow apertures extending through the plate, each aperture located to cooperate with a corresponding spotting member, each [the] aperture having an [axis] axis, [and] a first diameter, an upstream edge forming an inlet and a downstream edge forming an outlet, the edges defining the aperture, the corresponding spotting member [bodies] body having a second diameter wherein the second diameter is greater than the first diameter so that the spotting member may not entirely pass through the aperture, and wherein the first open end portion of the spotting member is adapted to extend into the corresponding aperture to a position where there is space between the spotting member and the aperture; and
turbulence means for creating turbulence in air flowing from the inlet to the outlet in the space between the spotting member and the aperture for removing liquid from the first open end portions of the spotting members [through the apertures].

45. (Currently amended) The assembly of claim 44, wherein the turbulence means comprises i)
aligning means for aligning the spotting members proximate to the apertures with each

spotting member body extending generally axially away from the corresponding aperture, ii) reciprocating means for repeatedly reciprocating the spotting members generally axially toward and away from the apertures while maintaining the spotting members axially aligned with the corresponding apertures and limiting axially inward travel to provide clearance with the apertures in the limiting position and iii) [a] vacuum means for drawing air around the spotting members to flow from the inlet to the outlet [through the apertures].

46. (Currently amended) The assembly of claim 45, wherein the vacuum means comprises a source of vacuum and a structure for coupling the apertures [plate] to communicate with the source of vacuum to draw air around the spotting members to flow from the inlet to the outlet [liquid from the microarray spotting members through the apertures].

47. (Currently amended) The assembly of claim 44, wherein the apertures comprise channels, [each channel defining an inlet and an outlet in fluid communication] the channels defined by the upstream and downstream edges.

48. (Original) The assembly of claim 47, wherein the apertures are arranged in parallel rows.

49. (Currently amended) The assembly of [claim] claims 44 or 45, wherein the spotting members comprise pins.

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50. (Original) The assembly of claim 49, wherein the pins are selected from the group consisting of solid pins and split pins.

51. (Original) The assembly of claim 44, comprising 48 apertures capable of simultaneously removing liquid from 48 spotting members.

52. (Original) The assembly of claim 44, comprising 32 apertures capable of simultaneously removing liquid from 32 spotting members.

53. (Original) The assembly of claim 47, further comprising a cover secured parallel to the plate over the inlets, the cover defining a plurality of cover apertures therethrough, each cover aperture concentric with an inlet of the plate, and the diameter of each cover aperture being less than the diameter of its concentric inlet.

54. (Currently amended) The assembly of [claim] claims 44 or 45, wherein the first open end portion is tapered.

55. (Original) The assembly of claim 54, wherein approximately half of the tapered first open end portion is adapted to extend into the aperture.

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56. (Currently amended) The assembly of claim [44 or] 45, wherein the first open end portion comprises a tip and the spotting member is reciprocable by the reciprocating means between first and [second] limiting positions, the tip located outside the aperture in the first position and the tip located inside the aperture in the limiting [second] position.

57. (Currently amended) The assembly of claim [44] 46, wherein the source of vacuum pressure provides a pressure of 50 to 90 psi.

58. (Currently amended) The assembly of claim [44] 46, wherein the source of vacuum pressure provides a pressure of 60 psi.

59. Cancelled

60. (Currently amended) A microarrayer, said microarrayer comprising:

a) a manifold assembly for removing liquid from a plurality of microarray spotting members;

b) a plurality of spotting members each having a spotting member body and a first open end portion for printing a spot on a microarray slide;

c) a plate, the plate defining a plurality of fluid flow apertures extending through the plate, each aperture located to cooperate with a corresponding spotting member, each aperture having an axis, a first diameter, an upstream edge forming an inlet and a downstream edge forming an outlet, the edges defining the aperture, a corresponding spotting member body having a second diameter wherein the second diameter is greater than the first diameter so that the spotting member may not entirely pass through the aperture, and wherein the first open end portion of the spotting member is adapted to extend into the corresponding aperture to a position where there is space between the spotting member and the aperture; and

d) turbulence means for creating turbulence in air flowing from the inlet to the outlet in the space between the spotting member and the aperture for removing liquid from the first open end portions of the spotting members [the manifold assembly of claim 44 or 45].

61. (Currently amended) A method of removing liquid from a plurality of microarray spotting members, comprising [applying a source of vacuum to the assembly of claim 44 or 45 and] creating turbulence in air flowing from the inlet to the outlet of the assembly of claim 44 or the microarrayer of claim 60 in the space between the spotting member and the aperture for removing liquid from the first open end portions of the spotting members [reciprocating the

microarray spotting members proximate to the apertures of the manifold to create air flow and turbulence between the spotting members and the apertures].

62. (Currently amended) The method of claim 61, wherein turbulence is created in air by:

applying a source of vacuum to the spotting members of the assembly to draw air around the spotting members to flow from the inlet to the outlet,
aligning the spotting members proximate to the apertures with each spotting member body extending generally axially away from the corresponding aperture,
repeatedly reciprocating the microarray spotting members generally axially toward and away from the apertures and limiting axially inward travel to provide clearance with the aperture in the limiting position to create turbulence in air flowing from the inlet to the outlet in the space between the spotting member and the aperture for removing liquid from the first open end portions of the spotting members [the spotting members are concentric with the apertures during reciprocation].

63. (Currently amended) The method of claim [61] 62, wherein the spotting members are about 100 micrometers away from the inlet prior to reciprocation.

64. (Currently amended) The method of claim [61] 63, wherein the spotting members are reciprocated about a distance of 1 mm.

65. (Original) The method of claim 61, wherein each spotting member includes a tapered first open end portion adapted to extend into the aperture, the tapered first open end portion received in the aperture during at least part of the reciprocation.

66. (Original) The method of claim 65, wherein the first tapered open end portion reciprocates in and out of the aperture.

67. (Currently amended) The method of claim [61] 65, wherein the tapered first open end portion is spaced apart from the aperture during reciprocation.

68. (Currently amended) A method of removing liquid from a plurality of microarray spotting members, the spotting members each having a spotting member body [having a second diameter] and a first open end portion for printing a spot on a microarray slide, the liquid removed through a [manifold] plate, the plate defining [having] a plurality of fluid flow apertures extending [therethrough] through the plate, each aperture located to cooperate with a corresponding spotting member, [the apertures] each aperture having an axis, [and] a first diameter, an upstream edge forming an inlet and a downstream edge forming an outlet, the edges defining a corresponding aperture, a corresponding spotting member body having a second diameter, wherein the second diameter is greater than the first diameter so that the spotting member may not entirely pass through the aperture, and wherein the first open end portion of the spotting member is adapted to extend into the corresponding aperture to a

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position where there is space between the spotting member and the aperture, the method comprising:

first [generally axially] aligning the spotting members proximate to the [manifold] apertures with each spotting member body extending generally axially away from the corresponding apertures] aperture;

[applying a vacuum for] drawing air around the spotting members to flow from the inlet to the outlet [through the apertures]; and

repeatedly reciprocating the spotting members generally toward and away from the corresponding apertures while maintaining the spotting members axially aligned with the corresponding apertures and limiting axially inward travel to provide clearance with the apertures in the limiting position,

wherein turbulence is created in air flowing from the inlet to the outlet in the space between the spotting member and the aperture wall [between the spotting members and the apertures] for removing liquid from the first open ends of the spotting members through the apertures.

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69. (Currently amended) The method of claim 68, wherein the spotting member is reciprocated between first [and second] limiting positions, the tip outside the aperture in the first position and the tip inside the aperture in the limiting [second] position.

70. Cancelled

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88. Cancelled

89. Cancelled

90. (New) The microarrayer of claim 60, wherein the turbulence means comprises i) aligning means for aligning the spotting members proximate to the apertures with each spotting member body extending generally axially away from the corresponding aperture, ii) reciprocating means for repeatedly reciprocating the spotting members generally axially toward and away from the apertures while maintaining the spotting members axially aligned with the corresponding apertures and limiting axially inward travel to provide clearance with the apertures in the limiting position and iii) vacuum means for drawing air around the spotting members to flow from the inlet to the outlet.